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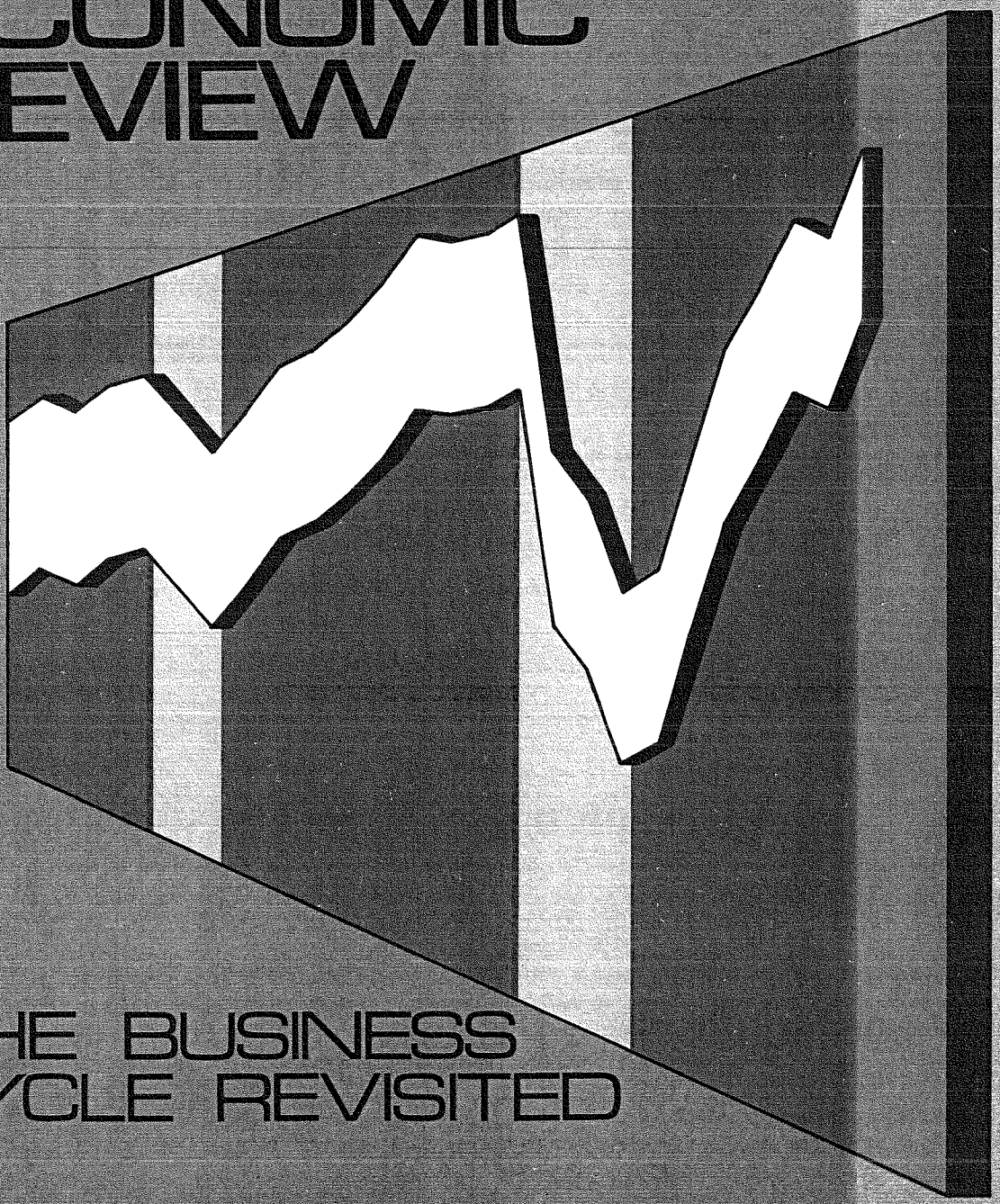
# ECONOMIC REVIEW



## THE BUSINESS CYCLE REVISITED

SPRING 1977

# Unemployment, Unused Capacity and the Business Cycle

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The unemployment and capacity-utilization rates measure the labor and capital market pressures in the nation's economy. The two measures have much in common, and between them provide a reasonably clear picture of how much slack is present in the economy, and how much real growth we may expect before the economy encounters serious bottlenecks.

This article examines relative movements in the two series throughout the postwar period. Until 1974, unemployment and unused capacity bore a stable relationship to one another. Since 1974, however, unemployment has been increasingly higher than one would have predicted on the basis of its relation to unused capacity[1] in previous cycles. Unused capacity, however, has behaved in the recent recession and in the present recovery just as it has in previous cycles. This observation leads to the conclusion that unused capacity is still a good measure of overall factor-market tightness while unemployment is not. The economy is thus likely to enter a period with available capacity constraining output but with the unemployment rate still well above 6 percent.

The remaining sections document these conclusions. Section I points out the potential noncomparability of the two series, but shows that, until 1974, they provided similar indications of factor-market tightness except during a few strike- or war-affected periods. Section II discusses the normal cyclical pattern of unused capacity and unemployment. The concluding Section III turns to the present discrepancy—unmatched in the postwar period—between unused capacity and unemployment. Basically, we find that unused capacity in the current recovery has generally matched its earlier pattern, as has the amount of *decline* (though not the *level*) of unemployment. This suggests that unused capacity is as much as ever a relevant measure of factor market tightness. Further, the elements which have produced the present very high unemployment, it will be argued, will not disappear quickly. High unemployment, both absolutely and relative to its past relation to unused capacity, is likely to remain a feature of the economy for at least three to five years.

## I. Unemployment-Capacity Relationship Over Time

Both the unemployment and unused capacity data rest on sample surveys—the first, of the civilian population, and the second, of manufacturers. Both are proximate measures of the degree of tightness in the markets for the two main factors of production. There is a strong reason why the two measures should track closely over time: capital is reproducible, and thus over long periods of time, the capital-labor ratio can be altered substantially. For example, an influx of labor could lower the wage rate as compared with the return to capital. In this case, the demand for labor by employers would rise, the demand for capital would decline, and after an adjustment period, there would be no important effect on the usage of either capital or labor (Chart 1).

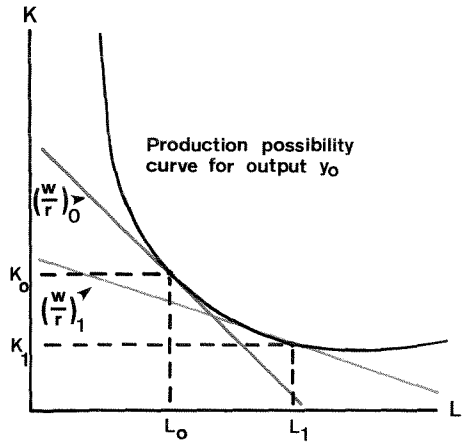
Suppose the wage rate relative to the return of the capital is $\left(\frac{w}{r}\right)_0$ with the constant-expenditure line in Chart 1 showing how a constant total cost can purchase various combinations of labor and capital. The production process itself implies a technological trade-off between added units of capital and labor, which

is labelled as the "production possibility curve" for the fixed output $y_0$. The point of minimum cost of production is reached where the marginal contribution of capital and labor to cost are the same: where the $(\frac{w}{r})_0$ line is tangent to the possibility curve. The least costly way of producing the output $y_0$ is to use an amount $K_0$ of capital and $L_0$ of labor. Now suppose the labor supply increases, initially driving unemployment up and wages down, with the cost line now at $(\frac{w}{r})_1$. Capital is now relatively less attractive than before, so manufacturers will tend to cut back on investment plans and hire more labor. Eventually we reach the new point of minimum cost, with all of the new labor absorbed (at $L_1$) and with less capital in use (at $K_1$). The result is a lower real wage, and a capital-labor ratio changed from $(\frac{K}{L})_0$ to $(\frac{K}{L})_1$, but with little effect on the long-run unemployment and unused capacity rates.

This argument applies only over substantial periods of time, both to allow for enough change in investment to alter the capital-labor ratio and to make the assumption of a flexible wage-to-profit ratio reasonable. This type of adjustment will not affect periods as short as a business cycle, for it does not pay to adjust production methods in periods as short as the typical recession. Thus both unemployment and unused capacity rise substantially in recessions, and remain high for some time after recessions end. Historically, however, the two measures have remained in close alignment despite three elements which could have changed their relationship to each other.

Chart 1

LONG-TERM CAPITAL-LABOR TRADE-OFF




First, labor force composition has changed over time, reflecting mostly an increase in female participation.[2] To the extent that different groups of workers are not good substitutes for each other in terms of skill, the composition shift may imply an increase in the observed unemployment rate associated with any given state of aggregate demand. However, we can analyze such compositional changes just as we did the relationship between capital and labor.

If one group enters the labor force in large numbers, that group's relative wage should fall, leading employers to increase hiring in that group. This should create some tendency for subgroup unemployment rates to equalize over time. We should note that subgroups of the labor force are not reproducible in the same sense that capital assets are, and that the labor market contains elements which prevent adequate short-term wage adjustment—among others, the minimum-wage law and its relationship to high unemployment among the young. These factors suggest that market adjustments among labor-force groups will be slower than between aggregate labor and capital, although market pressure should remain an important long-term force in equalizing unemployment between groups.

The second problem is that any sample survey—such as those used to develop our unemployment and unused-capacity measures—is open to some subjectivity on the part of respondents. For instance, someone who has been laid off but has stopped seeking work may perceive himself as unemployed, but may not be counted as such according to the official definition. In similar fashion, a manufacturer facing strong demand pressures may perceive his capacity as increasing because he has adopted more costly processes (like added shifts) that he would normally regard as uneconomic.

The Federal Reserve Board's capacity-utilization series—like the Bureau of Labor Statistics' unemployment series—must be regarded as an excellent example of the survey art.

Capacity utilization is a relatively ambiguous concept, and thus the Board uses two independent surveys in constructing its estimates of manufacturing capacity. One source provides data on real investment over the cycle (the Commerce Department's Bureau of Economic Analysis), and the second source provides capacity-utilization data (McGraw-Hill). The use of investment data avoids much of the subjectivity inherent in the utilization survey. For example, there is some tendency for manufacturers to report plant shutdowns during recessions as losses in capacity, when the closings are in fact temporary. The reported loss must be confirmed by a reduction in investment or increased scrappage before the Board will lower its capacity estimates and adjust the utilization data.

The BLS unemployment data are based on a monthly survey of 47,000 households, designed to measure the overall unemployment rate to within 0.2 percent. The survey includes questions to insure that respondents understand the exact meaning of the very precise BLS definitions of unemployment and labor-force participation. Consequently, any error in the survey must arise from a difference between the BLS intent—measuring the labor force—and the respondent's intent (aside from the pure sampling error in using 47,000 households to represent a labor force of nearly 100 million).

The main source of error concerning intent is probably the unemployment-insurance laws, which provide that a person who has been laid off must be looking for work (that is, must be in the labor force) to receive unemployment benefits. The law thus creates an incentive for some to *say* they are in the labor force when in fact they are not actively seeking work. Recent increases in unemployment benefits, and in the length of time benefits are paid, have probably increased the number of people in this position. (See companion article by Rose McElhattan.)

Finally, the capacity-usage figures apply by definition only to manufacturers. Manufacturing has declined fairly steadily relative to GNP over the postwar generation, reflecting the rise in government spending and in the consumption of services from 34.5 percent of GNP in 1950 to 50.1 percent in 1976. This shift may distort any relationship between unused capacity and unemployment, because the cyclicity of the shrinking portion of employment in manufacturing may differ from that of total employment.

## II. Cyclical Pattern of Unemployment and Unused Capacity

To analyze the importance of these considerations in determining movements in unemployment and unused capacity, we may compare the time series of the two (Chart 2). To make the series directly comparable, the actual unused capacity series has been re-scaled with the aid of the information in Table 1.

**Table 1**
**Unemployment and Unused Capacity in Five Post-Korea Recessions**
**(Percent)**

| | 1 Mean Level 1950-76 | 2 Average at recession peak | 3 Average at pre-recession trough | 4=2-3 Average increase in recession |
|---|---|---|---|---|
| Unused capacity | 18.1 | 25.2 | 11.4 | 13.8 |
| Unemployment | 5.3 | 7.0 | 4.1 | 2.9 |

The re-scaling of the data makes the unused-capacity series into a series with the same average recession run-up of 2.9 percent as the unemployment rate, as well as the same 1950-76 mean of 5.3 percent. In the chart, the average levels of unemployment and unused capacity serve as measures of normal factor usage, and their average recession increases serve as measures of the normal amount of fluctuation in the two series. It should be kept in mind that the unused-capacity series normally increases 5 percentage points—equal to (13.8/2.9)—for each 1-point increase in unemployment.

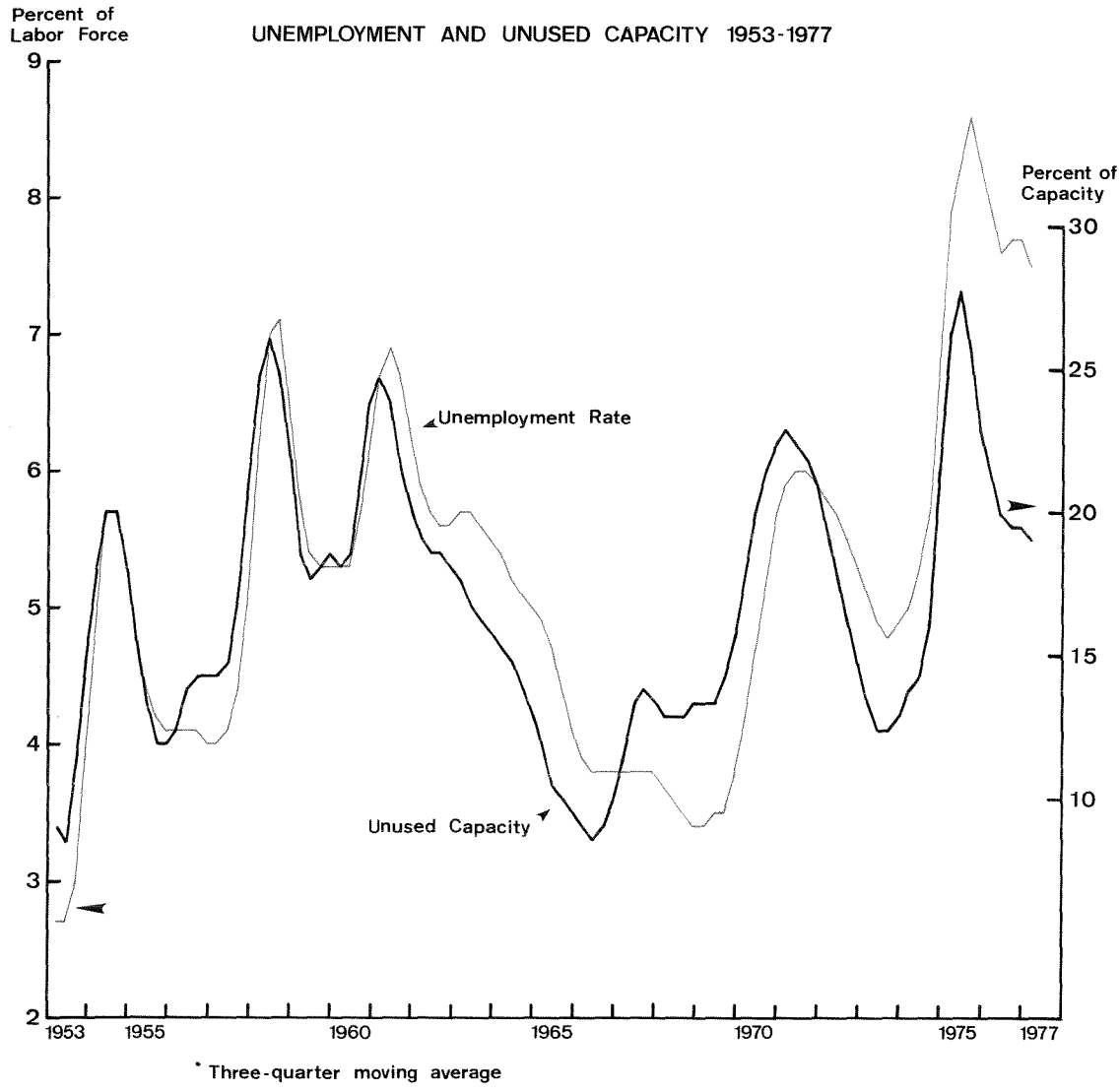
The chart data indicate, first, that the two factor-usage series told the same basic story until 1974. The two series peaked together in each recession through 1970, generally within one quarter of each other. Further, unemployment declined much more slowly than unused capacity in each post-war recovery (including the present

one), with the unused-capacity measure dropping well below unemployment by the third quarter of recovery. There is no evidence of any shift in the observed relationship between the factor markets until the 1974-76 recession-and-recovery.

A second observation is that unused capacity rises in periods of very tight labor markets (i.e., below about 4-percent unemployment). Increases occurred in 1955-56, and in 1966-67, at times of quite low unemployment. Increases in unused capacity did not occur at the recovery lows in unemployment in 1958-59 and 1972-73 when unemployment remained well above 4 percent.[3] This apparent anomaly is explained by induced investment in these periods of high demand for goods. A relatively low level of unused capacity coupled with a flat level of unemployment thus appears to be a reliable measure of great supply pressure in the economy.

A third useful observation is that a steadily growing gap has appeared between the two rates

Chart 2




* Three-quarter moving average

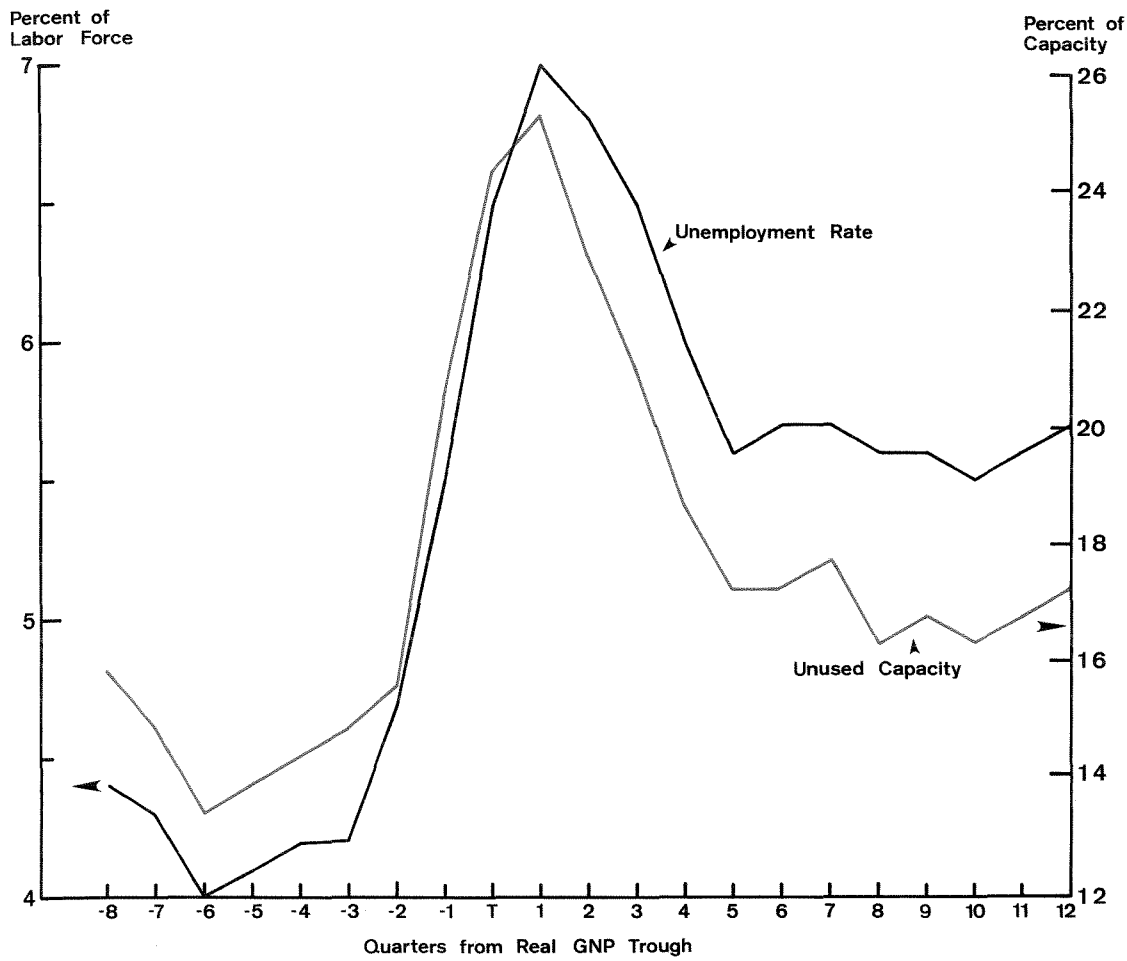
since the start of the 1974-75 recession. Only part of this can be attributed to the normally more rapid decline in unused capacity than in unemployment. This point will be discussed later in this article.

The cyclical behavior of unemployment and unused capacity in the past five cycles (Chart 3) also deserves analysis. First, unemployment and unused capacity have on average declined until the cyclical peaks were reached. Thus, the factor markets have generally failed to provide a systematic warning of the onset of recession. In effect, there is no "incipient recession" phase of the cycle, when income growth decelerates to the point of sluggish unemployment and unused capacity, but not to the point of qualifying as a recession. The unused-capacity rate provided evidence of tight supply conditions on two occasions—1955 and 1965—but recession did not follow for over two years following 1955, and for over four years following 1965.

Secondly, unused capacity tends to rise less rapidly than unemployment in recessions, but also tends to recover much more quickly, falling

Chart 3

UNEMPLOYMENT AND UNUSED CAPACITY—CYCLICAL AVERAGE*




*Five-cycle average, with troughs dated 1953.5, 1958.4, 1961.2, 1970.1, and 1975.3

to moderately low pre-recession levels by the fifth to seventh quarter after the recession trough. This suggests that unused capacity behaves very asymmetrically with respect to unemployment/unused capacity relationship probably usual recession-recovery pattern in GNP is for a sharp fall during recession (relative to its growth trend) followed by a long recovery period of growth above trend. But unused capacity falls in recovery almost as fast as it rises in recession, suggesting that early recovery consists for manufacturers of putting machines back to work before making new hires. This pattern is understandable; most machinery costs must be paid whether the machine is used or not, while most wage costs depend on the amount of labor hired.

Thirdly, and in contrast, unemployment follows the pattern set by GNP, with a rapid rise in recession and a prolonged period of slow decline thereafter. This pattern helps account for the perception many workers have of recession as lasting much longer than the official definition suggests. These workers define recession as a period of high unemployment, while statisticians define it as the preceding, much shorter, period of negative income growth.

## III. Outlook for Unused Capacity and Unemployment

Since 1974, there has been a substantial increase in the unemployment rate relative to unused capacity. Because unused capacity has shown no tendency to increase over time, we may ask whether this increment in unemployment will persist for any length of time.

In Section I, we argued that reproducibility of capital helps keep the average level of unused capacity stable over time, as manufacturers adjust their investment demand to keep their capital stock in line with the long-run demand they expect for their output. A portion of any needed adjustment can be accomplished fairly quickly by cutting investment sharply. The fall in fixed investment in 1974-75 was in fact quite sharp, and investment has remained sluggish since, thus accounting for the "normal" behavior of unused capacity despite the continuing low level of income relative to past trends.

The labor force does not have the same kind of self-adjusting capacity, so the severity of the 1974-75 recession has left us with substantial unemployment two full years after the recession trough. However, the amount of *decline* in unemployment we have experienced—from a high of 8.8 percent in 1975.2 to 7.4 percent in 1977.1—is closely in line with the decline in earlier recessions.[4] With unused capacity showing normal cyclical behavior, we may expect that with a continuing recovery, unused capacity by mid-1978 will reach a low level while unemployment is still in the neighborhood of 6½ percent.

There are two scenarios as to what may happen after mid-1978. The first is a period of long-term adjustment of the capital-labor ratio, as illustrated in Chart 1, and thus a return to a more typical unemployment/unused capacity relation. In the past, this scenario has required a shift to an investment-led recovery in output, so the appearance of strong investment growth would be a key that this scenario is being followed. The alternative possibility would be a recession after mid-1978, and a postponement of the adjustment until the succeeding recovery. There would be no reduction in unemployment relative to unused capacity.

The first scenario has been typical of recoveries with low unused capacity, as we expect in mid-1978. We may examine the two earlier periods when quite low levels of unused capacity were reached well before the trough in unemployment. These periods were in 1955 and 1965.[5] Both periods were part of long recoveries (1954-57 and 1961-69) and the low points in unused capacity were accompanied by substantial increases in investment. In both cases, unused capacity rose significantly (about 2 percent) in the year following the low point and remained at that new plateau until the cyclical peak in real income was reached. Also in both cases, unemployment continued to decline, though rather slowly, right up to the income peaks, which were marked by unemployment rates below 4 percent. Thus both periods marked long-run adjustments in the capital-labor ratio.

In the past, then, low unused capacity in mid-

recovery has not been a barrier to further expansion of output or to further reductions in unemployment. Should these events recur—especially the shift to an investment-led recovery—the more typical relationship of unemployment to unused capacity could be restored for the period after mid-1978.

It should be emphasized that this scenario is not inevitable, because it relies on a continuation of the economic recovery through 1978, and especially on greater investment growth. The shorter two of the four most recent recoveries (1958-60 and 1971-73) each ended without a long period of low unused capacity, and thus without a long period of high investment. Both ended with unemployment quite high by the standards of the other two recoveries. Should this kind of truncated recovery occur, the "normal" unemployment/unused capacity relationship probably would not be restored until well into the following recovery, that is, some time after 1980. Neither scenario, in any event, suggests the possibility of a return to historically low levels of unemployment for some time.

FOOTNOTES

1. To measure unused capacity, we subtract the published capacity-utilization rate from 100. Thus, a rise in unused capacity accompanies a **rise** in unemployment.
2. This aspect of the labor data is examined by Rose McElhattan elsewhere in this **Review.**
3. Strikes generally appear as one-quarter "blips" in both unemployment and capacity, and so barely affect the moving averages in Chart 1. The largest single post-Korea strike—the 1959 steel strike—affects our conclusion only moderately.
4. Okun's Law, the econometric rule-of-thumb relating changes in unemployment to growth in income, exactly predicts the 1.4-percentage point decline which has actually occurred. This indicates that changes in unemployment are still closely tied to changes in real income.
5. The war in Vietnam tended to limit the number of new entrants into the labor force in the 1965 period. However, the relatively small size of that war (as compared with Korea) makes it hard to adjust for that data.